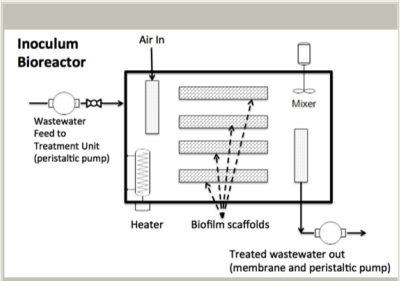
Rapid Activation of Biological Wastewater Treatment Systems, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

RESEARCH PROPOSED: Pancopia proposes development and testing of a novel inoculum combining three high performance biologics with the capability to remove high levels of organic carbon and nitrogen from wastewater, capable of preservation for a year, and which can be used to rapidly and reliably start up a biological wastewater system. Phase 1 feasibility criteria for proposed novel inoculum are removal of 85% of organic carbon and 85% conversion of ammonium (50% oxidized to nitrogen gas and remaining 50% converted to nitrite/nitrate) with a startup time of less than 45 days.
PROBLEM/OPPORTUNITY: Properly configured biological wastewater systems can treat wastewater containing high organic carbon and nitrogen and produce a high quality effluent using minimal consumables. However, such systems can be difficult to startup rapidly and reliably. Developing a reliable inoculum to permit rapid startup of biological wastewater systems that treat high levels of organics and nitrogen would make such treatment viable. PLAN/PROCESS OUTLINE: Two types of new, novel inocula will be developed, tailored to treat wastewater with high organic carbon and nitrogen. One inoculum will use live cultures stored dormant for 45 days before being used to start the reactor. The second inoculum will use lyophilized cultures stored for 45 days before being used to start the reactor. Two reactors will be used to test each inoculum; with one of the two reactors receiving inoculum added to the wastewater and the other reactor receiving inoculum embedded in a biofilm scaffold designed to promote growth and attachment of the organisms. BENEFITS: Phase 2 target criteria are development of an inoculum capable of removing 95% of organic carbon, and 95% conversion of ammonium (75% removed as nitrogen gas and remaining 25% converted to nitrite/nitrate) when treating ersatz EPB wastewater with a startup time of less than 15 days.



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Small Business Innovation Research/Small Business Tech Transfer

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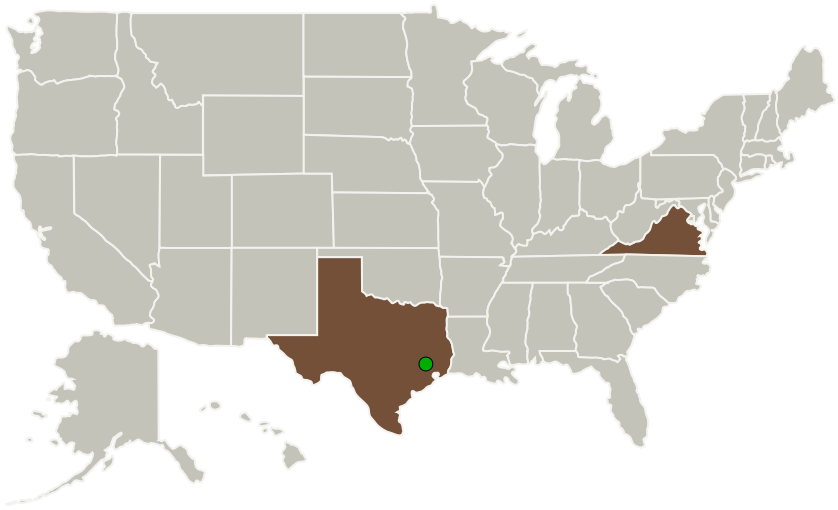
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Pancopia, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Hampton, Virginia
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Texas	Virginia

Project Transitions

June 2015: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Pancopia, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

William Cumbie

Co-Investigator:

William R Cumbie

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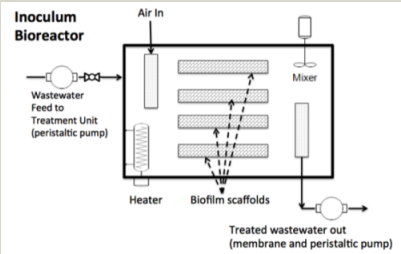
December 2015: Closed out

Closeout Summary: Rapid Activation of Biological Wastewater Treatment Systems, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139261)*

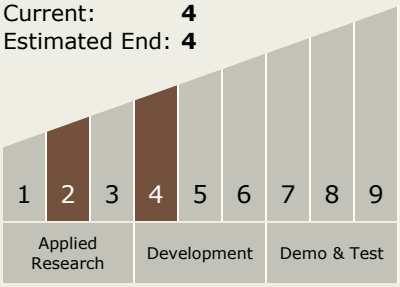
Images



Briefing Chart Image
Rapid Activation of Biological Wastewater Treatment Systems, Phase I
(https://techport.nasa.gov/image/136394)

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System